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ABSTRACT

A focused exploration of research presented at the International Academy for Information Management (IAIM) in 1997, this study applies the structuring of student teams recommended by Mennecke and Bradley (1997), adapts the roles, and extends structure to group meetings. Students enrolled in two sections of a required course in Database Systems participated in the study. Findings verify the increased team cohesion found by these prior researchers and, in addition, indicate that the use of meeting constraints as well leads to a more satisfying team experience. Recommendations are provided for structuring project teams so that procrastination is minimized and equal contribution to the effort is facilitated. The Team Process Evaluation form is appended. Seven tables include: age and experience; perceptions regarding project teamwork; perceptions regarding action lists; perceptions regarding roles assignment; impact of team process constraints; satisfaction with project experience; and learning content. (Contains 4 references.) (Author/AEF)

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TEAM PROCESS CONSTRAINTS: TESTING THE PERCEIVED IMPACT ON PRODUCT QUALITY AND THE EFFECTIVENESS OF TEAM INTERACTIONS

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A focused exploration of research presented at IAIM in 1997, this study applies the structuring of student teams recommended by Mennecke and Bradley (1997), adapts the roles, and extends structure to group meetings. Findings verify the increased team cohesion found by these prior researchers and, in addition, indicate that the use of meeting constraints as well leads to a more satisfying team experience. Recommendations are provided for structuring project teams so that procrastination is minimized and equal contribution to the effort is facilitated.

INTRODUCTION

The goal of this study is to extend the work of Mennecke and Bradley (1997) concerning the impact of structured roles on student team projects. Mennecke and Bradley (1997) address the problems associated with working in project teams for IS student projects:

- Students who choose to engage in group social activities prefer to work alone on projects.
- Teams require higher transaction costs in terms of time to complete the project, communication, and scheduling.
- Teams "procrastinate until the project due date" and "as the pressure increases, group cohesiveness breaks up" (p. 23).

Working with traditional students who lack work experience, they find students unskilled in team process. Therefore, they test structuring roles for project teams, and measuring results after controlling for many confounding variables. While their instruments do not find measures of satisfaction to be higher in the treatment group, they find that structuring roles improved the quality of the projects and improved group cohesiveness. They conclude that the added structure improved team process. They believe that increased use of "e-mail, list serv, chat room" (p. 24) would further improve team process and lower transaction costs.

Mennecke and Bradley (1997) provide some structure by requiring that each student assume one key role within the team. Their findings and presentation of these findings stimulated the current adaptation of the roles. In the current study, students are required to vary assigned roles over the course of the project. Precondition data is gathered, e.g., participation on prior project teams, work experience, preference for working alone or in teams, perceptions regarding the effectiveness of working in teams and transaction costs of team work. Not only are roles structured, but the conduct and scheduling of meetings is structured. Anecdotal evidence suggests that failure to meet throughout the semester and failure to conduct meetings

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effectively adversely affects team process. Meetings are a major source of team conflict. Further, documentation of team process are made a component of project deliverables and evaluation for the treatment group. After projects are complete but before projects are graded, students complete a questionnaire concerning the team experience as well as open-ended questions concerning the team process. The control or comparison group is another database class in which these team process constraints are not employed but which uses the same syllabus for the course and the same requirements for the database project.

Our objective is to recommend methods for improving student team process, beyond the increased team cohesion demonstrated by Mennecke and Bradley (1997) through the use of structured roles. We want these methods to lead to some degree of satisfaction with the team process. Further, we want to use the team project to teach effective meeting skills.

METHODOLOGY

Students enrolled in two sections of a required course in Database Systems participated in the study. One section applied the treatment described above; the other required team projects but did not structure the team interactions or even describe the possibility of role assignment or use of meeting agendas, action lists, and minutes. At the beginning of the semester, the treatment class is given a description of team process constraints, involving both meetings and structured roles. As recommended by Mennecke and Bradley (1997) in their future research section, extensive use of e-mail is required to facilitate communication and coordination.

- Project teams are to meet at least once per week, beginning with week 2 of the semester. A regular meeting time at the same place, time, day is strongly recommended. Teams may need to meet more than once per week during some phases of the project.

- Each project team member must play one of the three primary roles during the course of the semester and each of the three roles must be designated at each meeting. The three roles are meeting facilitator, scribe, and scheduler.

- Each meeting must have an agenda provided by the meeting facilitator to each team member prior to the meeting. E-mail is recommended for this task. Each meeting must result in an action list designating tasks to be performed, responsibility for the task, and deadline for the task. The first item on every meeting's agenda should be a review of the action list from the prior meeting. Each meeting's agenda should also include formal recognition of the approval of the minutes of the prior meeting. These minutes can be approved via e-mail after all necessary revisions are made. The scheduler should always be on each agenda, reporting on project status against the timetable.

- The scribe must record the minutes of each meeting and these minutes are an essential part of the project deliverables. The minutes must include the following items: members present, members absent, members playing each of the three primary roles, copy of the agenda, detailed notes on discussions/decisions for each agenda item, the action list for the next meeting. The action list for the next meeting must be distributed to each team member via e-mail within two days of the meeting. Minutes must also be distributed to team members for approval via e-mail no more than two days after each meeting.

- The scheduler must contact each team member at least two days prior to each meeting to confirm meeting attendance, reschedule meetings when attendance is problematic, and maintain the project timetable. The scheduler should report the status of the project against the timetable at each meeting. The team may wish for each member to serve as scheduler for two consecutive weeks.

After this description of team process is presented, each member of the class is asked to briefly introduce himself and to indicate good meeting times. Students chose their own team members after these introductions. Students in the control group also chose their own team members.

These project team constraints extend those specified by Mennecke and Bradley (1997, 21), where four roles are defined.

- Presider or Meeting Leader
- File Manager or Project Leader
- Meeting Coordinator
- Intermediary

We employ three roles which are parallel but not precisely equivalent to their first three roles.

- Facilitator
- Scribe
- Scheduler

The facilitator like the Presider or Meeting Leader develops and distributes a meeting agenda and is responsible for keeping the meeting on task. No Project Leader was designated but documentation, a primary responsibility of the File Manager or Project Leader, was the scribe's role for meetings. Project documentation would have been an action list item, assigned by consensus at the meeting. The Meeting Coordinator tasks were filled primarily by the Scheduler. The Scheduler also kept the project schedule or time table. Regularly scheduled weekly meetings were held, so no meeting coordinator needed to call a meeting. The Itermediary role, where a student was assigned to act as the intermediary between the project team and the instructor, was not employed. The roles have many similarities, but perhaps most importantly, students have well defined roles to play in both studies.

However, in this study, students must play all roles whereas roles were assigned for the entire project in the Mennecke and Bradley (1997) study. Our rationale is that students need to learn all three roles and that students who have played a role will tend to be more cooperative with other students playing this role. The major extension to team structure is to specify weekly meetings with an agenda, published minutes, and action list. This structural component should work to prevent procrastination, a major problem with student team projects.

RESULTS

The following research questions are examined through a two-part questionnaire completed at the close of the term project (Appendix A). By analyzing these perceptions by students, we will consider the following research questions:

Q1. Is the tendency to procrastinate reduced through the increased structure of team processes?

Q2. Do the students perceive the use of meeting constraints to be valuable?

Q3. Do the students perceive the assignment of roles to be valuable?

Q4. Do the students in the treatment group experience higher satisfaction with the team process?

We will also consider mitigating factors such as declared work experience, previous project experience within a class, and overall preference for team projects. Finally, recommendations for improving team process for IS student projects will be formulated, applying and building on the work of Mennecke and Bradley (1997). They demonstrated that group cohesion was positively impacted by their treatment but that satisfaction with "group process, satisfaction with the group's project, and group member ratings" (p. 22) were not significantly different in the treatment group.

MITIGATING FACTORS

Age and Experience

The age, number of prior information systems courses, and work schedules of the two groups were very similar. However, the control group, a slightly older group, had significantly more experience in information systems work, and of those who had such experience, the control group had a greater percentage of members who had been on development teams. This IS experience, coupled with development experience, should predispose this group to have a better project experience.

TABLE 1
AGE AND EXPERIENCE

ATTRIBUTES OF AGE AND EXPERIENCE	Control Mean Std. Dev.	Treatment Mean Std. Dev.	T-test *p* value
1. Average Age	29.73 7.71	27.55 8.35	.14
2. No. of prior IS courses	5.1 3.85	4.16 2.87	.35
3. Work full time	33.33%	30%	
4. Work part time	43.33%	45%	
5. Do not work	23.33%	25%	
6. Worked in IS (y/n)	43%	16%	.01
7. If y to #6, part of a development team? (y/n)	35%	8%	.009
8. No. of IS projects completed	2.2 1.47	3.21 1.51	.054

Overall preference for team projects. Students in both the treatment and control group agreed that they like to work on a project team and liked to work alone. The treatment class actually showed a stronger preference for working as a member of a project team, but that preference was not statistically significant compared to the control group. Both groups agreed that projects take more time if completed as a team activity. However, 88 percent of the students agreed with the statement that "Project quality is improved if the project is a team activity." There were no significant differences between the two groups in regard to preference for team projects versus working alone.

PERCEPTIONS REGARDING MEETING CONSTRAINTS

Weekly Meeting Time

The treatment group was required to meet weekly beginning with the second week of the semester. The objective of this constraint was to facilitate incremental work and thus, reduce procrastination. In class, the instructor strongly recommended establishing a regular weekly time and place, so that students could work their schedules around this regularly scheduled meeting.

Students perceived this practice to be highly effective means of preventing procrastination. The mean response to the statement, "Establishing a weekly meeting time helped the team to work on the project throughout the semester instead of as a 'last minute' endeavor," was 4.43 with a .68 standard deviation. The mode was 5.0 or strongly agree.

Agenda

In general, treatment students agreed that "Publishing an agenda for each meeting was valuable," with a mean response of 3.8 and standard deviation of .89. Ten percent of the students disagreed that the agenda was valuable, twenty percent were indifferent, and 70% agreed that the agenda was valuable. Only twenty percent strongly agreed, however. A more focused statement, "Publishing an agenda for each meeting caused us to use meeting time more effective," received a similar response: mean of 3.9 with a standard deviation of .91.

Action List

Treatment students tended to agree that the action list was valuable and that it helped the team stay organized. Agreement was not as strong or consistent concerning the action list's impact on everyone doing his or her fair share. However, only one student disagreed with this third statement. Half the students did find the action list helpful for distributing work equally.

TABLE 2
PERCEPTIONS REGARDING PROJECT TEAMWORK
5= Strongly Agree, 1=Strongly Disagree

	Control Mean, Std. Deviation	Treatment Mean, Std. Deviation	T-test, *p* value
I like to work on a project team.	3.80 1.16	3.75 .97	.84
I like to work alone.	3.60 1.10	3.3 .80	.22
I prefer to do project work alone.	3.20 1.37	2.65 .93	.13
I prefer to do project work as a member of a team.	3.50 1.25	3.90 1.02	.24
Projects take more time if completed as a team activity rather than as an individual activity.	3.10 1.45	2.95 1.32	.81
Project quality is improved if the project is a team activity.	3.10 1.47	3.5 1.28	.36

TABLE 3
PERCEPTIONS REGARDING ACTION LISTS

Statement	Treatment Mean Std. Dev.
Creating an action list was valuable	4.3 .57
Creating an action list helped us to stay organized.	4.4 .68
Creating an action list helped us to make sure everyone did his or her "fair share."	3.85 .93

Minutes

Not surprisingly, minutes were not altogether popular. On the scale of 1-5 with 3 being indifferent and 5 strongly agree, treatment students agreed (mean 3.75, std. dev. 1.07) on their value and agreed (mean 3.65, std. dev. 1.18) that recording and publishing minutes improved communication. Notably, action lists were perceived to be more valuable than minutes.

ROLES ASSIGNMENT

Three statements were designed to assess whether the student perceived playing each of the three roles to be of value. One of the differences with the Mennecke and Bradley (1997) study was that students had to play all roles. Then, the student was asked to assess whether the use of roles improved team process. Finally, students were asked to assess the value of each role. In general, treatment students agreed that playing a role, particularly

that of facilitator, had been a valuable experience. They perceived that the use of the three roles improved team process, with the role of facilitator being perceived as improving team process the most. Interestingly, only one student disagreed with each of the seven statements concerning the value of roles.

Perceptions of Impact of Team Process Constraints

Both the control and treatment groups perceived that team skills were improved by the project and that they had learned to use meeting time more effective. Stronger agreement occurred in the treatment group, but differences are not statistically significant (p= .41, .36). The treatment group agreed with the statement that the constraints had increased team effectiveness.

Satisfaction with the Project Experience

Mennecke and Bradley (1997) demonstrated that the use of roles increased group cohesiveness. The authors have observed that when students are unhappy with the project results or the experience itself, "finger pointing" occurs and students are unhappy with their group. Therefore, as an assessment of satisfaction, we asked students to agree or disagree with the statement, "I would choose the same team members again." Treatment group students agreed with the statement and were very close to strong agreement Even though the control group should have been predisposed to work well in teams because of their higher percentage of students with work experience and IS development experience, the treatment group actually ended the project more willing to work with their team again.

TABLE 4
PERCEPTIONS REGARDING ROLES ASSIGNMENT

Statement	Mean, Std. Dev.
Playing the role of facilitator was valuable to me.	3.65, .81
Playing the role of scribe was valuable to me.	3.55, .83
Playing the role of scheduler was valuable to me.	3.40, .75
Having a designated scheduler, scribe, and facilitator improved the team process.	4.10, .72
Having a designated scheduler improved the team process.	3.65, .75
Having a designated scribe improved the team process.	3.85, .75
Having a designated facilitator improved the team process.	3.95, .76

TABLE 5
IMPACT OF TEAM PROCESS CONSTRAINTS

Statement	Control Mean, Std. Dev.	Treatment Mean, Std. Dev.
My skill at working on teams has improved as a result of this experience.	3.83 .93	4.05 .89
I learned how to use meeting time more effectively.	3.83 .95	4.05 .69
The project team worked more effectively with the constraints concerning meetings and roles played than other teams on which I have worked which had no team process constraints.	N/A	3.90 .72

TABLE 6
SATISFACTION WITH PROJECT EXPERIENCE

Control Mean, Std. Dev.	Treatment Mean, Std. Dev.	T-test *p* value
3.24 1.41	4.35 .93	.003

SUMMARY OF RESULTS

We posed four research questions:

Q1. Is the tendency to procrastinate reduced through the increased structure of team processes?

Q2. Do the students perceive the use of meeting constraints to be valuable?

Q3. Do the students perceive the assignment of roles to be valuable?

Q4. Do the students in the treatment group experience higher satisfaction with the team process?

In answer to these questions, we found regular, weekly meetings tended to prevent waiting until the last minute. Students did perceive the use of all other meeting constraints to be valuable, and found the action list to be most valuable. Likewise, students perceived the use of roles to be valuable to themselves and to the project team, particularly the role of facilitator. Students in the treatment group would work with the same team again, satisfaction with the team process. Satisfaction with the team process was the strongest difference experienced in the control and treatment group. This finding extends Mennecke and Bradley's (1997) finding that cohesion increased with the use of roles.

STUDENT RECOMMENDATIONS FOR IMPROVING TEAM PROCESS CONSTRAINTS

Recommendations for improving team process constraints further include the following:

- Student comments reveal that changing roles throughout the semester became burdensome. They recommend having everyone play each of the roles for at least one week, then assign the roles for longer durations. Many students found the constant shift in roles confusing.
- Students recommend a midterm project review and submitting weekly team process documentation for feedback and possibly, grading. They would prefer incremental feedback.
- Thirdly, many students recommended a team contract to insure agreement on meeting times, roles, etc.

Some students commented that they found the constraints time consuming and burdensome, but the tenor of the comments was that students had found these constraints effective and used them voluntarily for projects in other courses.

LEARNING CONTENT

The objective of a project is two fold: students learn to work well on project teams and students reinforce course content by actually applying what is learned. Both groups were asked to assess whether or not the project helped them to learn content and thus affected their course grade. Interestingly, both groups perceived that the project had helped learn course content with the treatment group having a slightly stronger perception of learning content. However, neither group agreed that exam scores had been improved by their project work. This statement may confound satisfaction with the grade on exam scores with learning content through the project.

TABLE 7
LEARNING CONTENT

Statement	Control Mean Std. Dev.	Treatment Mean Std. Dev.	T-test *p* value
The project helped me to better understand topics and problems in the database course.	3.97 1.16	4.35 .59	.12
My participation on the project team improved my exam scores.	3.3 1.12	3.45 .89	.42

LIMITATIONS OF THE STUDY AND CONCLUSIONS

This study is primarily a qualitative study further exploring and applying the work presented by Mennecke and Bradley (1997). The two classes involved in this study are insufficient for reaching broad, general conclusions. While assumptions of randomness are not met, we have used statistical comparisons of groups as some indication of whether differences are significant. Because of the difficulty of comparing project results when two instructors assign the grade and when team process was a major grade component in the treatment group but not the control group, no objective measure of project quality has been used at this time.

The use of meeting constraints, particularly regularly scheduled weekly meetings and action lists, were perceived as valuable as was the use of roles. Regularly scheduled meetings did tend to reduce procrastination. The facilitator role was perceived as particularly important. Significantly, students operating under team process constraints were more willing to work together again, thus these constraints served to reduce the dissatisfaction often associated with student project teams. As an instructor, dealing with the students in the treatment group was much pleasanter because only two team members came to the instructor with team problems during the entire semester. As a result of this experiment, we recommend the use of meeting constraints and roles along with the following modifications:

- mid-term, project review. Teams review each other's work, then each team presents the project in class
- weekly submission of the action list along with results of prior week's action list and minutes of the weekly meeting
- each student plays each role at least one, then roles are assigned for the semester
- optional contract, with a discussion of possible contract points.

As Mennecke and Bradley point out, "Research of this type is always confounded by extraneous factors that cannot be eliminated" (p. 23). To some extent, what we have accomplished is a structured trial-and-error. But we have demonstrated that certain team process constraints do seem to make a positive difference for team process, student satisfaction, content learning, and instructor management of project teams.

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APPENDIX A
TEAM PROCESS EVALUATION

Name_____

Part 1: Using the following scale, pleaseevaluate the following statements. Please mark the accompanying Scan-tron form. Please record your name on the Scan-tron form as well as this form.

A. Strongly Agree *B. Agree* *C. Indifferent* *D. Disagree* *E. Strongly Disagree*

1. I like to work on a project team.

1. I like to work alone.

2. I prefer to do project work alone.

3. I prefer to do project work as a member of a team.

4. Projects take more time if completed as a team activity rather than as an individual activity.

5. Projects take less time if completed as a team activity rather than as an individual activity.

6. Project quality is improved if the project is a team activity.

7. Establishing a weekly meeting time helped the team to work on the project throughout the semester instead of as a "last minute" endeavor.

8. Publishing an agenda for each meeting was valuable.

9. Publishing an agenda for each meeting caused us to use meeting time more effectively.

10. Creating an action list was valuable.

11. Creating an action list helped us to stay organized.

12. Creating an action list helped us to make sure everyone did his or her "fair share."

13. Recording and publishing the minutes of meetings was valuable.

14. Recording and publishing the minutes of meetings improved communication.

15. I learned how to use meeting time more effectively.

16. My skill at working on teams has improved as a result of this experience.

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17. The project helped me to better understand topics and problems in the database course.

18. My participation on the project team improved my exam scores.

19. Playing the role of facilitator was valuable to me.

20. Playing the role of scribe was valuable to me.

21. Playing the role of scheduler was valuable to me.

22. Having a designated scheduler, scribe, and facilitator improved the team process.

23. Having a designated scheduler improved the team process.

24. Having a designated scribe improved the team process.

25. Having a designated facilitator improved the team process.

26. The project team worked more effectively with the constraints concerning meetings and roles played than other teams on which I have worked which had no team process constraints.

27. I would choose the same team members again.

Note: Questions 8-15, 20-27 were omitted in the comparison class questionnaire. A question regarding meeting frequency was added.

Part 2: Please answer the following questions in the space provided.

1. Number of prior information systems courses at KSU and other schools _____

2. Age _____

3. Work full time? _____ Part time?_____

4. Number of other courses taken this semester:_____

5. Have you ever worked in information systems? _____

6. If so, have you been part of a systems development team? _____

7. If you answered yes to question 5, please describe your information systems work experience briefly.

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The following questions apply to information systems course work only:

1. How many information systems projects have you completed?_____

2. How many projects allowed you to select your own team members?_____

3. If team members were assigned, what was the basis for assignment?

4. On how many projects were project teams asked to follow certain guidelines to improve team process? Please describe team process guidelines for prior project teams.

5. If guidelines have been given, which guidelines did you find effective?

6. What suggestions would you make to further improve team process for the database project?

7. If you do not prefer to work on a project team, please explain this preference.

Other comments?

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